Stack F-design

General Description

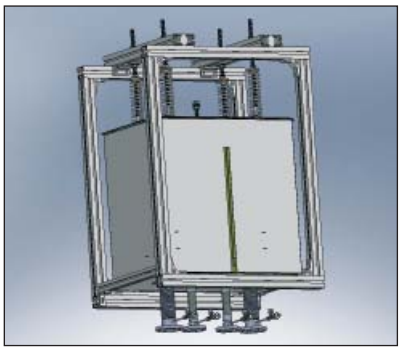
SOFCpower-HTceramix provides stacks based on the patented SOFConnex technology. The F-design stack has been developed for remote and combined heat and power applications up to 3 kW and can also serve as building block for distributed generation. The stacks can be fuelled with reformed natural gas, reformate gas or hydrogen. The F-design stack manifolds the air externally and the fuel internally and recovers the exhaust streams.

The use of the SOFConnex™ structure improves the thermal cycling tolerance of the stack, avoiding additional performance degradation due to thermal cycling. All the components are designed and manufactured based on low cost, environmentally safe manufacturing techniques using scaleable wet ceramic processes.

The SOFConnex™

HTceramix has developed and patented the SOFConnex™, a unique and innovative gas diffusion layer. This component combines three essential functions of the stack: it accomplishes current collection from the electrodes to the metallic interconnects; it manifolds the fuel between and on the cells; and it seals the gases.

The SOFConnex™ integrates the gas distribution on the cell, allowing the use of thin, unmachined metallic sheets instead of expensive, structured bi-polar plates. In assembly, the green ceramic-to-ceramic contact avoids rigid metal-to-ceramic interfaces, a potential source of cell breakage.



F-design stack in thermal module

Configuration

The F-design stack has a range from 5 to 50 cells, corresponding to 300 to 3000 W nominal power.
The box around the stack combines several functions:

1. Insulation with low thermal losses and external surface temperature below 50°
2. Clear and easy hot gas connections on the bottom
3. Measurement interface (voltages, temperatures, pressures) in the cold part to the side
4. Power electrical connection in the cold part on the top.
5. Mechanical compression and support of the stack

The stack design allows operation in co-flow or counter-flow upon customer requirements. Remaining fuel at exhaust can be analysed, burned or recycled in the system.

Besides the strict quality control of all individual components, the stacks are delivered with a QC data sheet indicating actual performance and pressure drop at nominal conditions.

Our engineering support is offered for the optimal integration of our product into the customer system or test facility.

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Stack F-design

F-design stack specifications and operation conditions

Number of cells in stack	5 - 50		
Nominal Stack Power	300 – 3000		W
Ideal current at nominal operation point	Approx. 80		A
Cell's footprint	230 x 140		mm x mm
Active area per cell	200		cm^2
Stack's dimensions	Depth	200	mm
	Length	400	mm
	Height per cell	4.5/cell	mm
Minimum operating voltage per cell	0.7		V
Ideal operating voltage per cell	0.75		V
Ideal stack operating temperature	800		°C
Max. stack operating temperature	850		°C
Operating pressure	Atmospheric		
Fuel	Hydrogen or reformate		
Hydrogen volume flow rate per cell	600-1600 [3-8ml/min.cm2]		ml/min
Hydrogen humidification ratio	~3% (bubbler @ ambient temperature)		
Oxidant	Air		
Oxidant flow rate ratio (lambda)	4 - 10		
Stack air inlet temperature	700-800		°C
Stack fuel inlet temperature	700-800		°C
Nominal pressure drop on air side	20		mbar
Nominal pressure drop on fuel side	20		mbar
Mechanical pressure on stack	6		N/cm2

Specifications subject tot change without notice

2 kW stack integrated in a demonstration system

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